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Title:
Rural electrification after the war
Place:
St. Louis
Date:
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U. S. Rural electrification administration.
Rural electrification after the war, a preliminary report ... St. Louis, United States Department of agriculture, Rural electrification administration [1944]
2 p. l., 19 p. 28½cm.

RESTRICTIONS ON USE:

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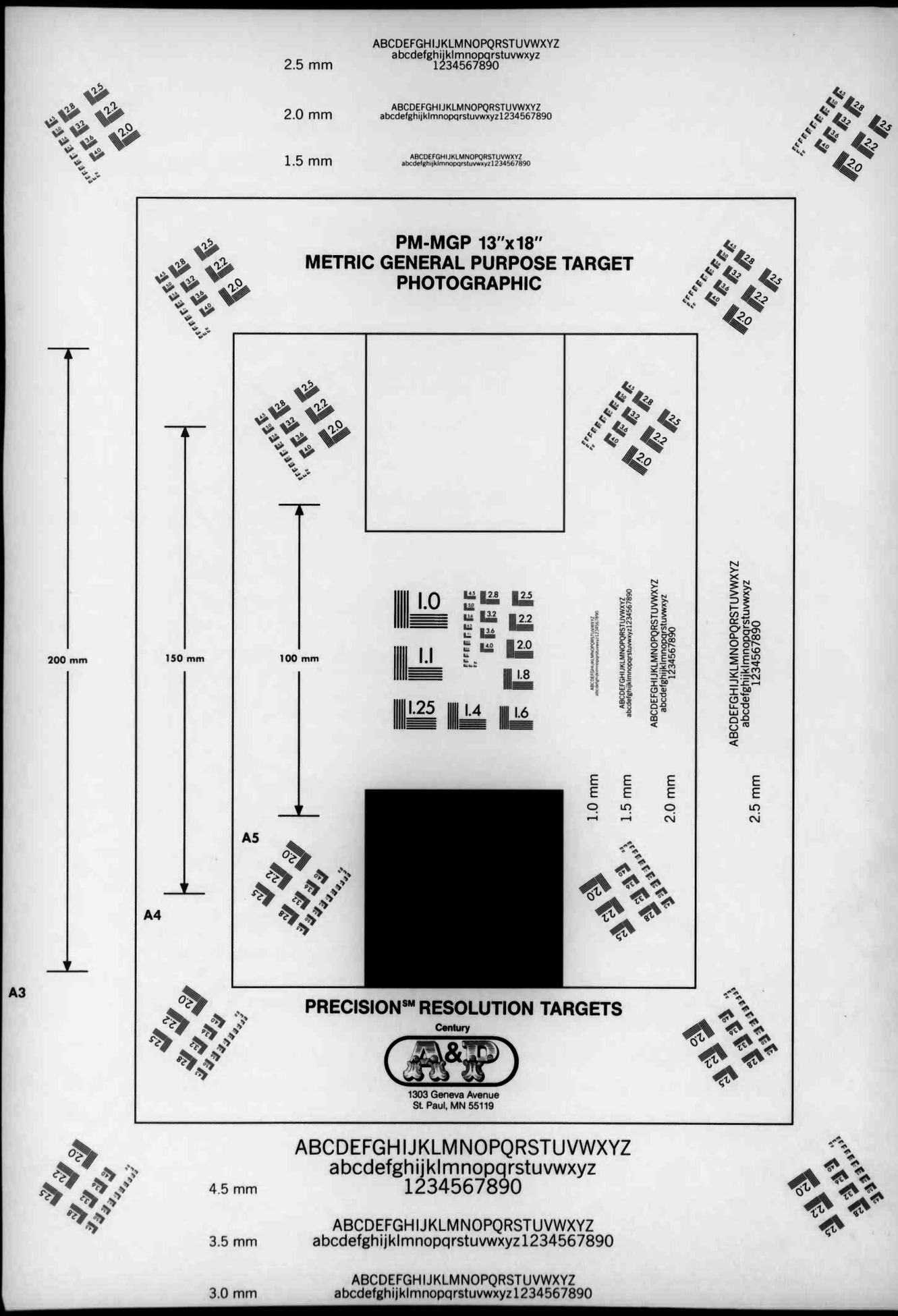
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RURAL ELECTRIFICATION AFTER THE WAR

A Preliminary Report

THIS IS A PRELIMINARY REPORT OF THE NATIONAL JOB STILL TO BE DONE IN RURAL ELECTRIFICATION. IT IS MADE TO THE USDA INTERBUREAU COMMITTEE ON POSTWAR PROGRAMS BY THE REA POSTWAR PLANNING COMMITTEE. WHILE IT IS SUBJECT TO REVISION AFTER CONSIDERATION BY THE INTERBUREAU COMMITTEE, NEVERTHELESS IT IS THE RESULT OF PAINSTAKING RESEARCH AND STUDY BY SPECIALISTS IN THE FIELD AND IT SETS FORTH FUNDAMENTAL PRINCIPLES WHICH MUST GOVERN RURAL ELECTRIFICATION IN THE FUTURE.

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"These are the fundamental principles which must underlie the expansion of rural electrification:

"First: Rural homes need electricity as much -- if not more -- than city homes. We can't have a decent standard of rural living without the things which electricity provides for the farm homes. In addition electricity increases the efficiency of farm production.

"Second: We must look upon the furnishing of electricity to farmers as an opportunity for service to agriculture rather than a means for making a profit.

"Third: REA cooperatives are the best means of getting electric service to the maximum number of rural people at the earliest date. That is true because REA cooperatives -- the same as all true cooperatives -- are organized for service and not for profit."

- from an address by Claude R. Wickard, Secretary of Agriculture, on Sept.20, 1944, at Neillsville, Wisconsin.

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IN BRIEF

This Statement tells what progress has been made in rural electrification so far, what the postwar objectives should be, why an accelerated postwar program is desirable and important, what it should be possible to accomplish in 5 years, what can be done through REA in 3 years, and how the job can be done.

It shows that little more than 40 percent of our farms are electrified and that 3,540,000 farms and about 2,800,000 other rural dwellings are still without central station electric service.

It sets as postwar objectives (1) electric service to all rural people, (2) full use of electricity on the farmstead, (3) its full use for rural community welfare, and (4) its use in developing local rural industries.

It estimates that a vigorous 5-year program can provide service to 3,655,000 additional rural families and will require about 2-3/4 million man-years of employment. This will involve the expenditure of about 1 billion dollars for line construction and expenditures by old and new rural consumers amounting to about $750,000,000 for wiring of premises, about $700,000,000 for plumbing installations, and about 3 billion dollars for electric appliance and equipment purchases, or a total expenditure of about 5-1/2 billion dollars.

Such a program will be a tremendous stimulus to private employment. Since it is projected as a self-liquidating program, it means no burden to the taxpayers and will correspondingly reduce the need of tax-supported public works programs during the reconversion and readjustment period. It will bring rural electrification in America on a par with other countries, will help to make farm life pleasanter and more attractive, farming easier and more profitable, and will create a better social economic and cultural environment for our rural population generally.

But the job can be done only if the principle of area coverage is carried out in this program. Otherwise there will remain many unserved and unservable pockets because the cost of bringing electricity to these sparsely settled communities separately would be prohibitive.

The proposed REA 3-year program contemplates line construction by REA-financed cooperatives to bring service to about 1,300,000 additional rural families. It is estimated that such a program will require about $579,000,000 of REA loans.

The last part of the Statement emphasizes the need of cooperation by various groups and agencies, and particularly by the rural people themselves, if the job is to be done quickly and effectively.

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PART I—PROGRAM AND PRESENT STATUS OF RURAL ELECTRIFICATION

Farm electrification advanced very slowly during the 53-year period from 1882, when the first central generating system went into service, to 1935, when the Rural Electrification Administration(REA)was created. A few farmers were connected to central station power prior to World War I, and the early twenties saw a short-lived spurt in which progress made in electrical engineering was reflected by a small increase in the number of farms served. As shown in Table I, however, only 10.9 percent of all US farms had received central station electric service by 1935. Farmers and farm organizations chafing at the slow rate of progress, increased their demands for government action. One result was the establishment of REA with an action program primarily to make service available to these farm people who were without electric service, and to related agricultural community action.

Farm Electrification

The U.S. Census of 1940 reported 6,097,000 farms in the United States, of which 1,853,000 were receiving central station electricity. Since the Census enumeration it is estimated that 704,000 farms have been electrified, raising the total number to 2,557,000 as of January 1, 1944. These figures are shown in Table 2.

Electrification of Rural Dwellings

According to the 1940 Census there were 15,709,000 rural dwellings. Of this number, 7,642,000 were classified as farm, and 8,057,000 as non-farm dwelling units.As shown in Table 2, a total of 2,351,000 rural farm dwellings and 6,185,089 rural non-farm dwellings were reported to have electric service in 1940.

The difference in the Census figures as between farms and rural farm dwellings is explained by the definition of rural dwelling used in the Census classifications: ".....the living quarters occupied by, or intended for occupancy by, one household. ..Rural non-farm units are those located outside the boundaries of urban places, but not on farms....Rural farm units are those located on farms outside urban places..." Since there are sometimes several dwelling units on one farm, the number of farm dwellings is greater than the number of farms.

Unelectrified Farms and Rural Homes

As indicated in Table 2, 829,000 farms and rural homes have been connected to central station power lines since the 1940 Census was taken. This leaves a total of 6,344,000 rural farm and rural non-farm dwelling units without electric service. About one million of these appear to be within the service area of existing urban power systems. Figure I indicates by counties where these unelectrified farms and rural homes are located. To bring electricity to them is a challenging job.

The REA Program

REA was created by Executive Order of the President on May 11, 1935, and was given permanent status by the Congress through enactment of the Rural Electrification Act of 1936. It was transferred to the Department of Agriculture on July 1, 1939. The Act empowers REA to make self-liquidating loans to qualified organizations with preference to non-profit and cooperative organizations, for the construction of power facilities to persons in rural areas without central station service, and for financing the purchase of electric facilities and equipment by rural consumers.

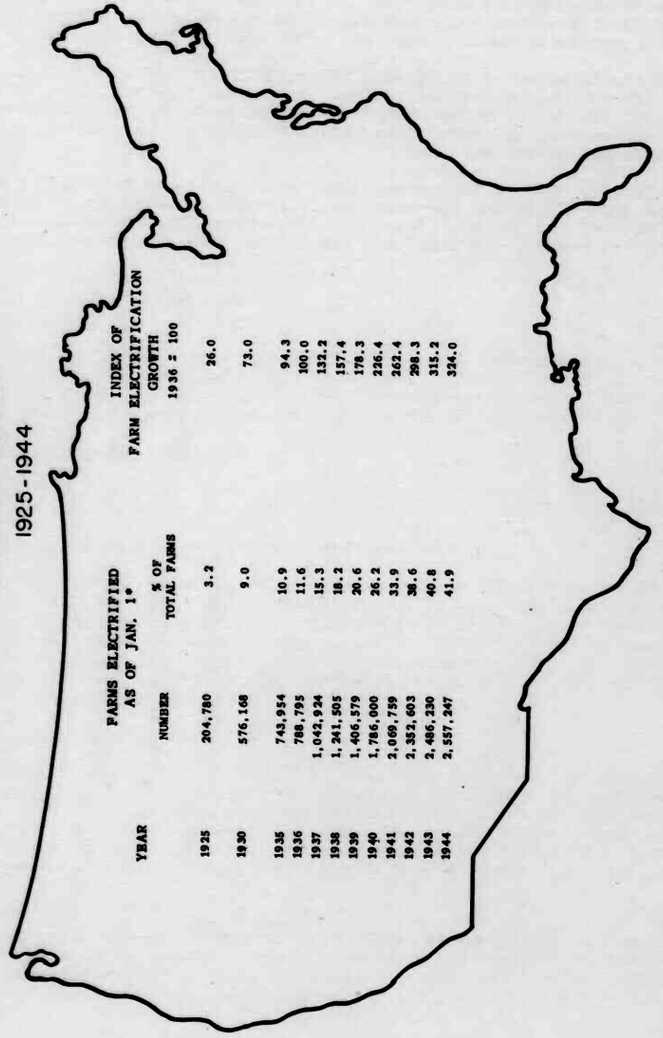
The stimulating effect of this dynamic federal program is reflected in Table I. Between 1935 and 1944, the number of farms electrified increased from 740,000 to 2,557,000. No figures are available which show the growth during this period in the number of rural non-farm establishments electrified, but the indications are that non-farm rural service kept pace.

Up to June 30, 1944, REA had approved loans to 887 borrowers totalling $498,811,446, of which $387,630,670 had been advanced; 815 borrowers had 398,000 miles of power lines in service on that date, bringing electricity to 1,152,031 consumers, of which 889,051 were farmers. The location of REA-financed systems is shown in Figure II.

TABLE 1

FARMS IN THE UNITED STATES WITH CENTRAL STATION ELECTRIC SERVICE

1925-1944



YEAR	FARMS ELECTRIFIED AS OF JAN. 1* NUMBER	% OF TOTAL FARMS	INDEX OF FARM ELECTRIFICATION GROWTH 1936 = 100
1925	204,780	3.2	26.0
1930	576,168	9.0	73.0
1935	743,954	10.9	94.3
1936	788,795	11.6	100.0
1937	1,042,924	15.3	132.2
1938	1,241,505	18.2	157.4
1939	1,406,579	20.6	178.3
1940	1,786,000	26.2	226.4
1941	2,069,759	33.9	262.4
1942	2,352,603	38.6	298.3
1943	2,486,230	40.8	315.2
1944	2,557,247	41.9	324.0

* Data as published by the Edison Electric Institute

TABLE 2

STATUS OF THE ELECTRIFICATION OF FARMS AND RURAL DWELLINGS IN THE UNITED STATES

JANUARY 1, 1944

STATUS OF FARM ELECTRIFICATION

TOTAL FARMS (U. S. CENSUS 1940)		6,097,000
FARMS ELECTRIFIED AS OF 1940 (U.S.CENSUS)	1,853,000	
ESTIMATE OF FARMS ELECTRIFIED FROM 1940 TO 1944	704,000	
FARMS ELECTRIFIED AS OF 1/1/44		2,557,000
FARMS UNELECTRIFIED AS OF 1/1/44		3,540,000

STATUS OF THE ELECTRIFICATION OF RURAL DWELLINGS

ALL RURAL DWELLING UNITS AS OF 1940 (U. S. CENSUS)		
RURAL FARM	7,642,000	
RURAL NON-FARM	8,067,000	
GRAND TOTAL RURAL DWELLINGS		15,709,000
RURAL DWELLINGS ELECTRIFIED AS OF 1940 (U. S. CENSUS)		
RURAL FARM	2,351,000	
RURAL NON-FARM	6,185,000	
RURAL DWELLINGS ELECTRIFIED FROM 1940 - 1944		
RURAL FARM	704,000	
RURAL NON-FARM	125,000	
ESTIMATED FARM AND NON-FARM	829,000	
TOTAL ELECTRIFIED RURAL DWELLINGS 1/1/44		9,365,000
RURAL DWELLINGS UNELECTRIFIED 1/1/44		6,344,000

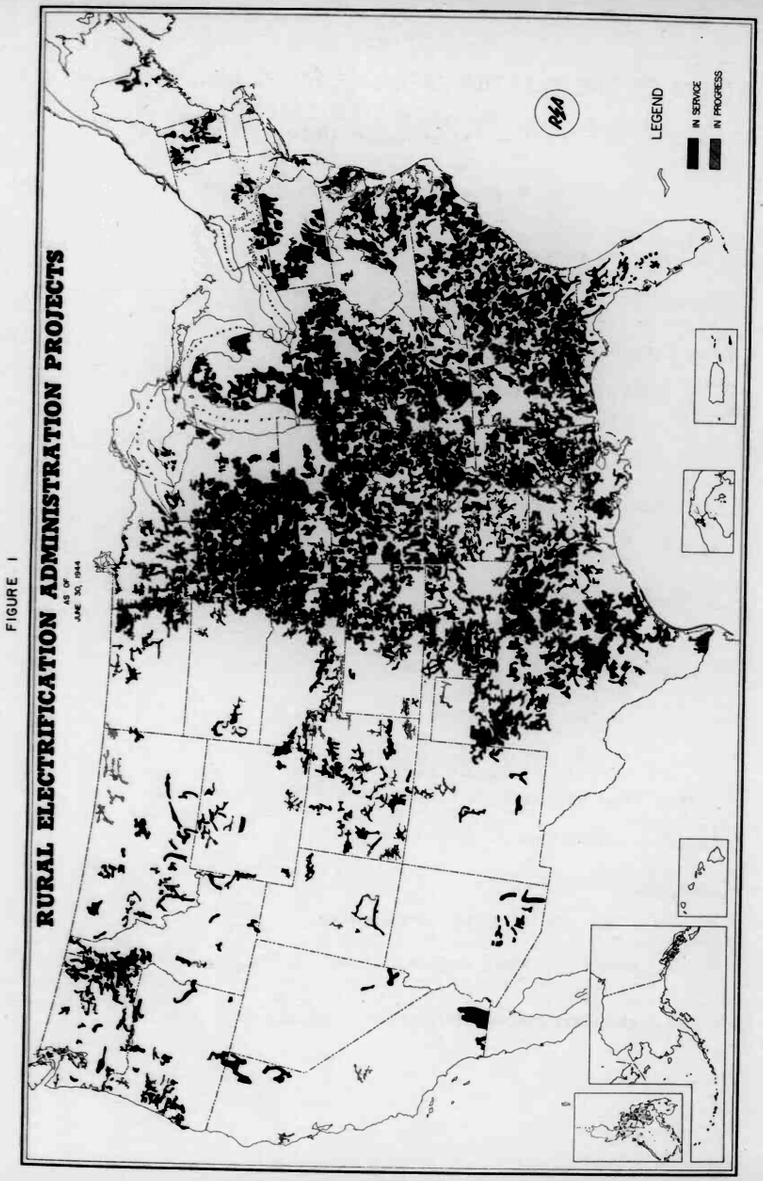


FIGURE I

PART II—OBJECTIVES OF A POSTWAR PROGRAM

A rural electrification program for the postwar period must be geared to meet the following objectives if it is to bring the greatest possible benefits to our rural population and to the Nation as a whole.

Electric Service to All Rural People

Central station electric service at low-cost non-discriminatory rates should be extended to all rural communities and farms on an area-wide basis as rapidly as materials and manpower will permit.

Full Application of Electricity to Farm Production and Farm Family Living

Relatively few farmers have so far learned to put electricity to the greatest possible use on the farmstead and in the farm home. New and old farm users of electric service will require help and guidance in its full application. Electro-agriculture is a key to farming as a successful business in the postwar world. Production and conservation of crops and livestock depend more and more on electrical aids. And the effective application of electricity to the many possible household uses has been recognized as an essential to farm family health and welfare.

Full Use of Electricity for Rural Community Welfare

Rural communities are threatened by social and cultural stagnation unless their physical facilities are modernized to meet the needs of today and tomorrow. Electricity is one of the most important factors in that process. It is basic to the effective use of rural schools, churches and community centers, to the establishment of community health clinics, service enterprises, entertainment and recreational facilities. Every rural community should be encouraged and enabled to utilize electricity for all possible improvements. One of the possibilities is the use of rural power lines for local and long distance telephone service.

Full Rural Industrial Use of Electricity

There are still many untapped or inadequately utilized natural resources in rural areas. There is also need of rural processing industries close to the source of production. And after the war there may again be a seasonal, if not year- round, oversupply of manpower in many rural areas. The welfare of the Nation demands that these rural resources and needs be not neglected. Electricity provides a key to their development. Therefore, the development of every type of suitable rural industry in every electrified rural area should be considered part of a National rural electrification program. To be of maximum service to farm people, such developments should be cooperatively owned and controlled wherever possible.

PART III—REASONS FOR AN ACCELERATED PROGRAM

There are a number of important reasons why a vigorous rural electrification program should be launched as rapidly as the war situation will permit. Some of them are implied in the preceding statement of objectives. However, for the sake of emphasis they are also included here.

Stimulation of Private Employment

The shifting from a war to a peace economy will release increasing numbers of men and women from war production and from the armed forces. If we want to avoid large-scale unemployment, we must create as many job opportunities as possible. The construction of rural power lines, the installation of wiring and plumbing, and the purchase of electric farm and household equipment by new and old rural consumers will necessitate industrial production involving nearly three million man-years of labor. Such a program will therefore be extremely helpful in stimulating private employment.

A Self-Liquidating Program

The program outlined in this statement considers only self-liquidating developments. It will therefore not be a burden on the taxpayers of the Nation. On the contrary, it will correspondingly reduce the need of tax-supported public works employment. Because of these facts, its acceleration during the reconversion period is particularly desirable.

America Still Behind Other Countries in Rural Electrification

In 1935, when less than 11 percent of American farms had electric highline service, farm electrification had reached 85 percent in Denmark, 90 percent in Germany, 95 percent in France, and practically 100 percent in Holland. Even today, with slightly more than 40 percent of our farms electrified, we are still far behind these and other countries in that respect. The excuse that the lower population density in many of our rural areas makes the extension of electric service to them not feasible is no longer valid. The REA program has demonstrated that even thinly-populated rural areas can be served by the application of the area coverage principle and by means of non-profit, farmer-owned and controlled cooperatives organized for the specific purpose of providing electric service to their members.

Importance of Electricity to Farm Production and Management

Agricultural leaders and educators are fully aware that electricity is the greatest single factor in bringing farming to a degree of efficiency in keeping with the advances made in industrial production and management. If the family-size farm is to survive and to hold its own in competition with corporation farming and with post-war farming in other countries, it must be enabled to take full advantage of electricity in the production and preservation of crops and in livestock management.

There is insufficient space here to enumerate the many practical uses of electricity for saving time and labor, for reducing farm operating costs and increasing farm income. It provides light and heat and power for many purposes including also refrigeration and the pumping of water. One Kwh will pump 1,000 gallons of water from the average farm well. It will milk 30 cows, heat 5 gallons of water, grind 200 bushels of grain, run a tool grinder for 4 hours, shell 30 bushels of corn, cool 10 gallons of milk, cut one ton of ensilage and elevate it into a 30-foot silo. The importance of electricity to efficient farming became so obvious early in the war that the War Production Board felt justified in releasing materials highly important to war needs for the electrification of more farms during the war.

Electricity Needed for Better Farm Family Living

Electricity on the farm makes possible the use of many modern conveniences which eliminate drudgery, save time, provide added comforts, and increase the well-being of the farm family. Running water in the house brings better sanitation and saves many steps. Refrigeration preserves food and makes better nutrition possible. The electric washer and iron make the family laundry less of a chore. The radio keeps the farm family in touch with the nation and the world. Eyesight is preserved by good lighting. And many other household tasks are made easier by the use of various electric appliances. The people now on farms will no longer be satisfied to go without the many blessings which electricity brings to the farm home. And few of the many rural young men and women now in the armed forces or in war factories will want to go back to the farm unless there is at least an early prospect of getting electricity with its resulting modern conveniences. Accelerated farm electrification will lessen to some extent the problem of the urban industrial labor market by inducing rural youth to return to the rural areas from which they came.

Improvement of Rural Community Facilities and Services

To the extent that social and economic progress of rural communities lags behind urban-industrial progress, the welfare of the nation as a whole is impaired. In the case of the unelectrified rural community this lag is accentuated.

Of course, more than one single factor or group of factors may be responsible for the lag, which, in turn, invites a run-down-at-the-heels condition. It is apparent, however, that as their lack of modern facilities became more conspicuous by comparison with nearby urban developments, rural communities offered less attraction to their people.

If rural communities are to retain (or re-acquire) the sense of civic responsibility essential to the maintenance of democracy, those rural communities must be revitalized by getting the modern tools necessary to live in the modern world. Rural leaders recognize that many of the important implements for bringing about and maintaining higher community standards are dependent on the wide and efficient use of low-cost electric power. Schools, churches, community centers, health clinics, service enterprises, recreational facilities, automotive and farm implement repair shops,

cold storage locker plants — all of these need electricity to bring the maximum benefit to rural areas and communities. Such improvements speed up the modernization of rural America.

Some progress has been made in the use of electrification in economic and social advancement of the rural community; a substantial expansion of past progress is a legitimate part of a well-rounded program of national rural electrification,

One important need is for rural local and long distance telephone service. There are now fewer telephones in rural areas than 20 years ago. Many now existing are limited exclusively to local service. Technical investigation carried on in the pre-war period shows that telephone communication can be made available over the rural power lines and by tying in with existing telephone systems, intercommunication can be arranged with all parts of the country.

Development of Rural Industries

Development of new rural industries and industrial decentralization constitutes an almost untouched field which holds promise of important public values. The TVA has successfully demonstrated the peacetime, as well as wartime benefits, of such developments. Power developments of recent years have contributed immeasurably to the production of war materials and equipment. Widespread availability of ample low-cost electric power makes possible decentralization of industry. REA experience shows that with the availability of reasonably priced power comes a substantial increase in the number of small rural industries. Farseeing persons visualize these sound developments as a key to greater rural prosperity.

The early American farmer and his community aimed at maximum self-sufficiency as a matter of necessity. The dangers of the predominantly one-crop agriculture were revealed in the recent depression which found millions of farm families unprepared to make effective use of their potential resources.

Complete rural self-sufficiency is incompatible with the standard of living to which rural, as well as urban, people are entitled. But the coming of electric power to rural areas offers untold opportunities not only for increasing self-reliance on the farm, but also for developing industrial activities in the rural community catering to local needs and utilizing local resources.

Development of rural industries may open a new frontier to the men who return from the armed services. This is an opportunity for agriculture and the rural area to contribute again to the progress of the nation. Part-time, farm-rural industrial employment holds promise of contributing to stability of income, maintenance of high living standards and promotion of rural security.

The natural and human resources of most rural communities are still being exploited, rather than conserved. Objectives of a national rural electrification program should therefore include the development of rural industries dependent on the availability of low-cost electric power, to the end that rural communities may employ their natural and potential wealth for building a more stable rural life.

Importance of Proper Land Use

Electric power and productive electrical farm equipment are becoming increasingly important in facilitating desirable adjustments in land use. Area-wide electrification makes possible alternative uses of land. Low-cost power permits using land according to its capabilities. One of the immediate effects of electric power on

land-use practices is diversification of farm enterprises. The kinds of electrical equipment purchased for the farm in various parts of the country indicate this.

South and Southwest farms have added poultry and dairy production along with new crops such as sweet potatoes and peanuts. It is possible to grow sweet potatoes on a commercial scale profitably in certain areas because electricity permits proper curing and storage without the risks of loss from spoilage.

Another change in land-use made possible by low-cost electricity has been irrigation, in areas where adequate supplies of underground water permit. Some areas of the Southwest have shifted from predominant cash grain farming to specialty crops or a combination of livestock and crops, due to the development of adequate water facilities and dependable, comparatively inexpensive power.

In some parts of the country dairying has become a major farm enterprise where cash crop production once predominated. War conditions have undoubtedly accelerated this shift, but electrical dairy equipment, including the milker and milk cooler, has also been a factor. Truck farming has become profitable in a number of areas as a result of the availability of electric power for supplying water, operating processing equipment, such as canning, dehydrating and freezing. Farm forestry, which has been recommended as a desirable use of land in some areas, can also be made more profitable by the application of low-cost power.

Combinations of poultry, dairy, or livestock production with cash crop production, especially on the small family-size farms of the nation, have nearly always accompanied farm electrification. It encourages development of the family-size farm by making possible higher incomes and higher standards of living on those farms.

These illustrations are sufficient to indicate how rural electrification directly or indirectly encourages the use of land according to its best capabilities. Although a rural power line does not determine the pattern, it does greatly influence proper land-use. It is already apparent that the postwar demand for rural residential and farm properties from veterans and others will far exceed the supply of available good farm land. If this demand is to be satisfied without the prospect of the creation of substandard living conditions, fullest advantage must be taken of electricity in the development of proper land use particularly in less prosperous rural areas.

PART IV—OTHER FACTORS AFFECTING THE PROGRAM

In the preceding parts, the objectives and the need of an accelerated rural electrification program have been indicated. But while its desirability is beyond any doubt the question may properly be asked whether, and to what extent, such a program can be made practicable on a self-liquidating basis. Fortunately, REA's experience over the past nine years provides the basic answers to this question. The feasibility of the program depends primarily on the few major factors considered below.

Cost of Obtaining Service

The early history of rural electrification showed that the average farmer cannot afford electric service if he has to lay out a considerable sum of money to get the line to his farm and if he must agree to a high minimum service guarantee and to high service rates. REA has demonstrated in nearly every state that electric service on a self-liquidating basis can be brought to farmers without such inequitable requirements. The example set by REA-financed cooperative power systems has resulted in a lowering of requirements by most power companies supplying rural service. If this progressive policy is adhered to by all agencies building rural lines in the postwar period, the rural demand for electric service will for some years to come be ahead of the ability of all agencies combined to satisfy it fully.

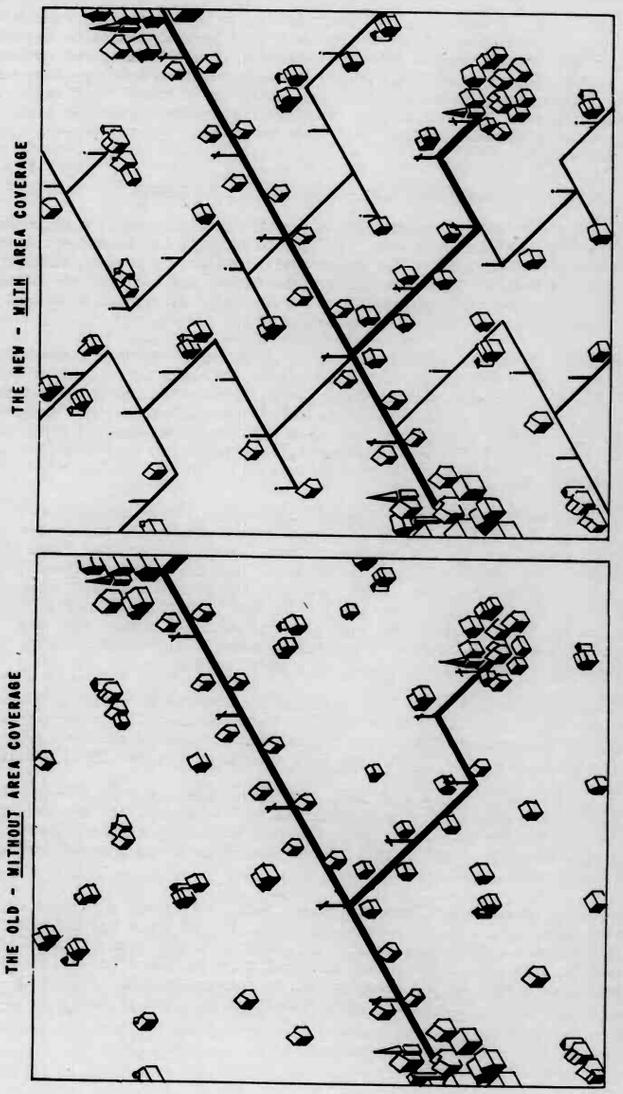
The Principle of Area Coverage

The program outlined in Part V is based on the assumption that rural electrification will be carried out as far as possible on an area coverage plan. That this can be done has been demonstrated by electric cooperatives in many places. In fact, development on an area-wide plan offers the only assurance that virtually all rural homes and other rural establishments, such as schools and churches, can obtain electric service at reasonable rates without the need of subsidies or grants-in-aid of some sort.

Area coverage merely means making electric service available to all rural establishments in a given area, without leaving gaps of unserved sectors within the area or leaving stranded farms located on the fringes. In applying the principle, the boundaries of an area are determined largely by geographic and physical considerations, to assure compact operating systems.

The practice, all too frequent in the past, of providing service selectively only to those farms and rural homes readily accessible from the highways, or located in densely-populated areas, or promising relatively large immediate loads, and ignoring other potential consumers, has deprived many farms of electric service. This practice of "skimming the cream" not only restricts the number of dwellings that can have service, but also results in high construction costs because of piecemeal additions from time to time. Area coverage appears to be the only way substantial progress in rural electrification can be made without subsidy. Experience has shown that construction to serve all rather than a selected few permits mass production methods in the development and more efficient management in the operation of these local systems. The net results are lowered costs and availability of high-line service to all people in a rural area.

THE OLD AND THE NEW PRINCIPLES GUIDING THE DEVELOPMENT OF RURAL ELECTRIFICATION



THE USE OF THE COMPLETE COVERAGE PRINCIPLE ASSURES AVAILABILITY OF ELECTRIC SERVICE TO ALL RURAL CONSUMERS WITHIN AN AREA; IGNORING THIS PRINCIPLE RESULTS IN THE PERPETUATION OF UNSERVED SECTIONS.

Failure to apply the area coverage principle would unquestionably result in the creation and perpetuation of unserved pockets. Such pockets cannot be served even with REA financing, unless the low consumer density in these pockets can be counterbalanced by higher density sections within the same distribution systems, or the lines physically integrated with others in such a way as to bring the fixed costs down to a low unit figure. The goal of area coverage rural electrification will not be reached if power companies attempt to revive the rather general pre-war practice of "cream skimming."

Demand for Electric Household and Farm Productive Equipment

In estimating the active demand for electric rural household appliances and farm productive equipment after the war, it will be helpful to consider the relative degree of saturation of some of the major appliances at the present time. On the basis of surveys made by REA-financed systems before the war, and of other available data, REA estimates the amount and value of major electrical equipment in use on United States farms in 1943 as shown in Table 3.

This estimate omits the amount and value of plumbing equipment installed in farm homes using electric water pumps. Furthermore, it takes no account of a large variety of electric home and farm appliances known to be in use on many farms, but for which no reliable survey data are available. The items omitted comprise not only those in the "gadget" category, but also such thoroughly useful items as ironers, pig brooders, electric fence controllers, egg candlers, insect traps, and graders for fruits and vegetables.

However, even with regard only to major appliances, a mere projection of these estimates into the postwar period would give a wrong picture of the active demand to be expected. There is a cumulative demand from already electrified farms for electrical equipment not obtainable during the war. This includes replacements as well as additional equipment desired. Also, there is the prospect of new types of appliances and equipment not generally available through commercial channels before the war. Some, like the farm freezer, had just about reached the market when war came. Others, particularly equipment based on the progress made in electronics during the war, are being developed for the great potential postwar market.

As indicated in Table 3, most farm families have so far invested more money in electric household appliances than in electric farm equipment. Household uses of electricity, the advantages of electric lights, radio, washing machine, iron and refrigerator, are so well known that they have naturally received first consideration.

Because of the low percentage of farm electrification prior to creation of REA, not much attention was paid to the manufacture and marketing of low-priced, efficient electric farm equipment. It is therefore not surprising that the sudden nationwide expansion of rural electrification found most farmers unprepared to make profitable use of electricity.

However, much progress has been made since 1936. Pertinent publications by REA, the Extension Service and other Federal agencies, and by state agricultural colleges, a wider dissemination of manufacturers' literature, demonstrations of electrical farm equipment in electrified areas, the national farm equipment tour conducted by REA, the cumulative effect of the examples set by forward-looking farmers in electrified areas, and of their outstanding performance in war food production—all of these

have resulted in a rapid change of attitude concerning the farm uses of electricity. It is therefore obvious that there will be a far greater demand for electric farm equipment as well as for household appliances after the war.

Demand For Water Pressure Systems and Plumbing

As shown in Table 3, only about 25 percent of all electrified farms had electric water pumps in 1943. And not all of these farms were equipped with complete water and plumbing systems.

A modern water and sewage disposal system is probably the greatest single benefit which electricity can bring to a farmstead. Why, then, are so few farms so equipped? In all probability, the initial cost of the water and plumbing system itself is the major reason, coupled with the bother and cost of incidental building alterations, and a lack of understanding of how running water can be utilized to increase income to offset its cost. Farm people who had never experienced the convenience of running water in the home were too readily resigned to the belief that the tedious, antiquated practice of hauling water from well or hand pump must continue as one of the unavoidable burdens of farm life. In the case of tenant-operated farms, the owner did not measure the value in attracting good tenants against the cost outlay. Since the installation of a farm water system and plumbing entails a considerable expense, it is understandable that farm people, when obtaining electricity for the first time, were inclined to postpone these improvements in favor of other uses of electricity whose benefits in relation to cost were more obvious.

Actually, water under pressure on the farmstead can serve a variety of extremely important uses. Running water in the home (preferably hot and cold) at the kitchen sink, the washtub, the bathtub or shower, and for a flushing toilet and appropriate sewage disposal, means less drudgery, greater comfort and better health for the entire family. On the farm, water under pressure offers protection against fire, saves labor of pumping and carrying water for poultry and livestock, increases farm income by providing plenty of drinking water for poultry and livestock around the clock, and by insuring the farm vegetable garden against the effect of prolonged dry spells.

For these reasons, rural planners and educators now include water-pressure systems for the farm and rural homes as an essential of better rural housing standards. Shortly before the war, many REA-financed electric cooperatives undertook special educational efforts, with the assistance of REA, to make their members more fully aware of the importance of a farm water system and plumbing. The Agricultural Extension Service, Vocational agriculture teachers, and departments of agricultural engineering and home economics in land grant colleges also undertook related educational programs. As a result, the demand for water systems on electrified farms was growing noticeably until the war interrupted this farm plumbing program. It is highly probable that the postwar demand will far exceed the prewar demand.

Financing of Line Construction

Before the war, the electric utility industry generally did not request government financing for what rural lines it decided to build. There is no evidence to indicate that there will be any change in this policy after the war.

However, past experience indicates that a large part of rural line construction after the war will have to be undertaken by non-profit, farmer-owned cooperatives if universal low-cost electric service is to be made available to rural America. How large this construction program will be and how rapidly it can be carried out will depend primarily on action of the United States Congress. The attitude of the Congress appears to be indicated by the recent passage of the so-called Pace Bill,

TABLE 3

ESTIMATED AMOUNT AND VALUE OF MAJOR ELECTRICAL EQUIPMENT ON UNITED STATES FARMS 1943

HOME APPLIANCES	PERCENT ON ELECTRIFIED FARMS	NUMBER OF UNITS	AVERAGE VALUE PER UNIT	TOTAL VALUE
RADIOS	90	2,208,690	$ 40.00	$ 88,347,600
IRONS	85	2,085,985	4.00	8,343,940
WASHING MACHINES	55	1,349,755	75.00	101,231,625
REFRIGERATORS	40	981,640	150.00	147,246,000
TOASTERS	30	736,230	5.00	3,681,150
VACUUM CLEANERS	20	490,820	60.00	29,449,200
HOT PLATES	15	368,115	2.50	920,287
COFFEE MAKERS	9	220,869	4.50	993,910
ELECTRIC RANGES	4	98,164	130.00	12,761,320
ROASTERS	2	49,082	24.00	1,177,968
				$394,153,000
FARM EQUIPMENT				
BROODERS	25	613,525	25.00	15,338,125
WATER PUMPS & INSTALLATION	25	613,525	135.00	82,825,875
ELECTRIC MOTORS	20	490,820	25.00	12,270,500
CREAM SEPARATORS	15	368,115	125.00	46,014,375
MILKING MACHINES	10	245,410	175.00	42,946,750
MILK COOLERS	7	171,787	165.00	28,344,855
POULTRY WATER WARMERS	2	49,082	3.50	171,787
DAIRY WATER WARMERS	1	24,541	35.00	858,935
FEED GRINDERS	1	24,541	75.00	1,840,575
				$230,611,777
TOTAL INVESTMENT IN MAJOR HOME AND FARM EQUIPMENT IN USE ON FARMS				$624,764,778

which lowers the interest rate on REA loans below the scale originally set in the REA Act of 1936, and extends the permissible period of amortization. This broadening of the loan financing conditions will make it possible for REA-financed cooperatives generally to do a more complete area coverage job than would otherwise be the case.

Financing of Consumer Purchases.

Since cash payment or private financing of wiring, plumbing, and electric purchases by consumers was the general practice before the war, it may be assumed that the accumulation of war savings will favor a continuation of that practice in the postwar period. Still, it would be over-optimism to expect that each farm family's war savings will be adequate for purchases of electric farm equipment and home appliances, as well as for purchases of other consumer goods and for making needed farmstead improvements.

In the interest of a stable peace-time economy, it may become advisable for the federal government to supplement individual and commercial financing or wiring, plumbing and electric equipment purchases by rural consumers. However, it is not expected that the demand for such governmental financing will become general. Authority for consumer purchase financing is contained in the REA Act. Although such financing has been freely offered to REA borrowers ever since 1936, it accounts for only 2 1-2 percent of total REA loans.

Importance of Local Initiative

The only way a farmer can get electric highline service to his farm is by going after it. No electric cooperative or other supplier will serve him until he has applied for the service. And no one can afford to build lines in any area unless the people in the area have indicated their desire for electric service. This means that there can be no rigid, centralized planning from the top down. The details of a national program of rural electrification must be based on locally-developed plans.

As shown in FigureII, the location of unelectrified rural establishments is known in a general way. But how soon and how vigorously after the end of the war in Europe rural electrification can proceed in any particular area, will depend primarily on the vision and action of the people in that area.

Local planning for rural electrification should not stop with getting the lines built. It should include the effective utilization of electricity for various community improvements as indicated in preceding parts of this statement. And it might profitably concern itself also with what electricity can do in connection with the development of soil conservation practices and with other problems of most effective land-use.

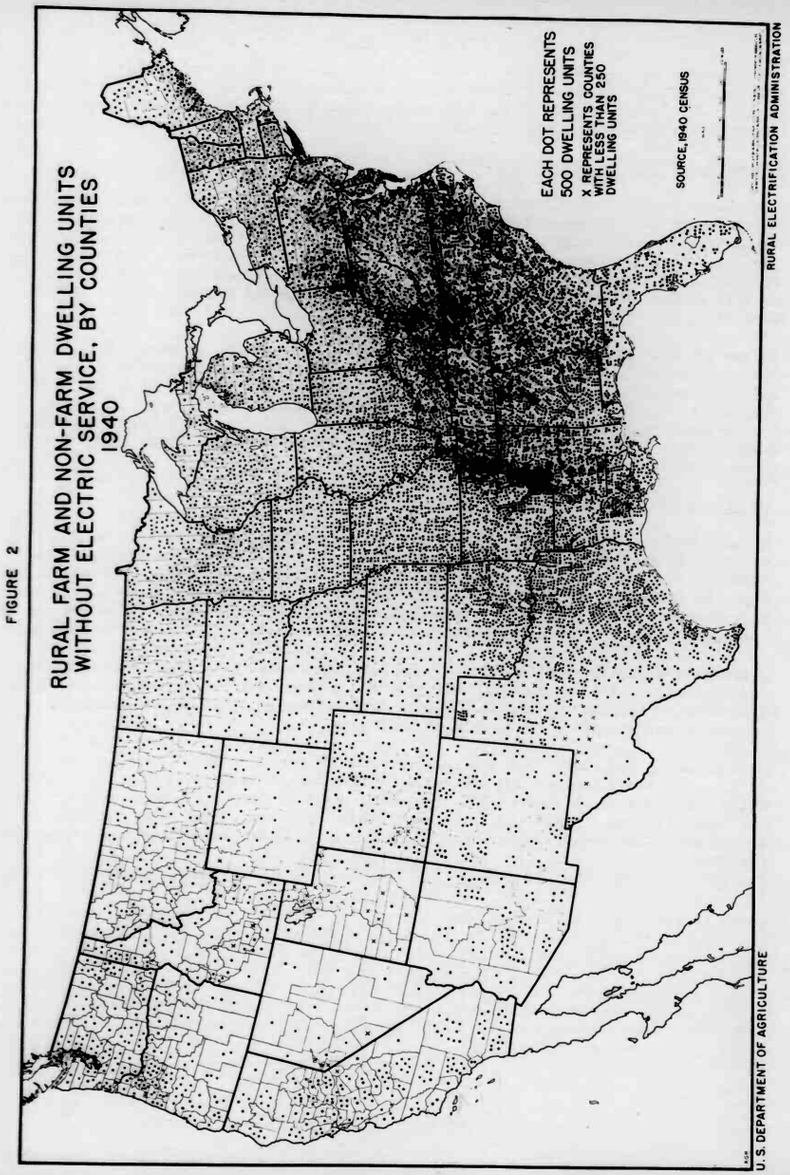


FIGURE 2

PART V—SCOPE OF THE PROGRAM

It should be clear from what has been said before, that no complete and detailed blueprint for a national postwar rural electrification program can be worked up at this time. But enough facts and indications of trends are available to show what needs to be done and to arrive at a reasonable estimate of what can be done as soon as the materials and manpower situation will permit.

The following estimates are based on various sources of information, including Census data, REA experience and studies, information obtained from REA-financed cooperatives, from state agricultural postwar planning committees, and from other bureaus of the Department of Agriculture.

It is estimated that about 952,000 of the 6,344,000 unserved rural dwelling units, shown in Table 2, are located in suburban areas and can be served by urban power systems. This reduces to 5,392,000 the number of unserved rural dwellings which will need to be considered in a strictly rural postwar electrification program. As shown graphically in Table 4, it is estimated that the cost of line construction, based on REA prewar construction costs, to reach these 5,392,000 potential rural consumers, will amount to about $1,600,000,000, and that about 800,000 man-years of direct and indirect labor will be required to do the job.

No one can foretell how long it will take to complete this job. But it is REA's considered estimate that about 3,655,000 of these potential rural consumers can be reached within 5 years after line construction materials have again become generally available. This would, of course, require an intensive construction program not only by REA borrowers, but also by all other groups and agencies concerned with supplying rural electric service. It is virtually impossible to forecast or even to estimate reliably how long it might be until the remaining 1,737,000 potential rural consumers (or whatever the number may turn out to be as a result of rural population changes since the 1940 Census) will get service. Detailed discussion is therefore confined to the immediate 5-year program.

An Immediate 5-Year Program

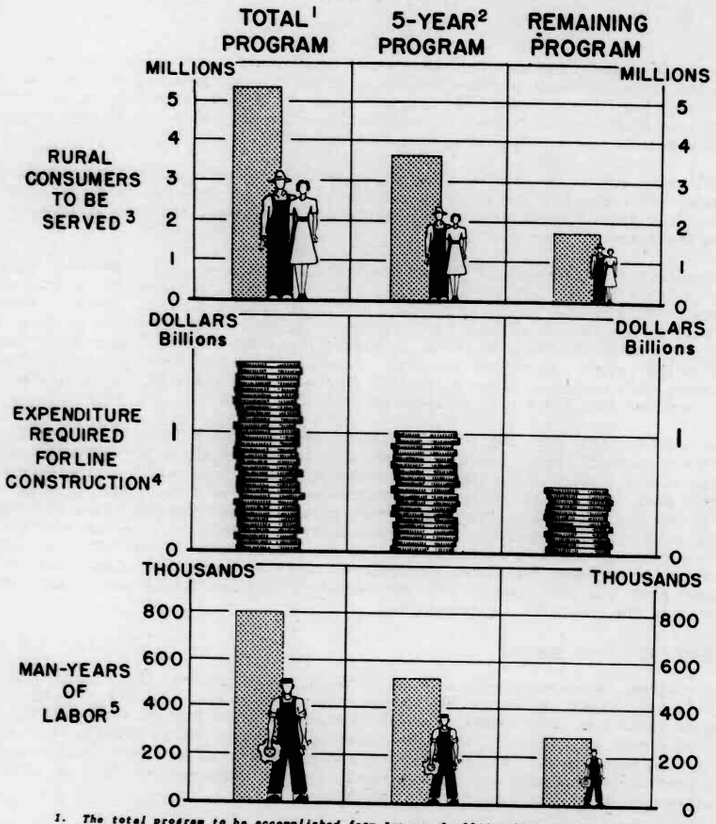
This program, as shown graphically in Table 4, will require the expenditure of about $1,042,000,000, based on REA prewar construction costs, for construction of lines to serve 3,655,000 additional rural consumers. It will involve about 521,000 man-years of direct and indirect labor for line construction. It is based on the validity of the assumptions that (1) materials and manpower will be available as rapidly as needed; (2) private and public rural power systems are willing and able to undertake area-wide line construction programs.

This line construction program will result in considerable expenditures by these newly-connected consumers for the wiring of their premises, for plumbing installations, and for the purchase of electric farm and household equipment and appliances. Also, rural establishments electrified before the war will need additional wiring, plumbing installations, and a variety of electric equipment.

TABLE 4

SUMMARY OF RURAL ELECTRIFICATION PROGRAM FOR THE CONSTRUCTION OF NEW DISTRIBUTION LINES BY RURAL POWER SYSTEMS IN THE UNITED STATES

January 1, 1944



1. *The total program to be accomplished from January 1, 1944 will be reduced by the number of rural consumers electrified during the period of restricted wartime activity. It is estimated that an average of 11,530 new rural consumers will be served each month by all rural power systems for the duration of the restricted program. This estimate is based on a careful analysis of consumer connections from the program's inception.*
2. *An estimate of rural establishments without electric service as of January 1, 1944 which must be served by rural utility systems as distinguished from approximately a million rural non-far establishments located on the fringe of urban development which may best be served by urban utilities.*
3. *The five year immediate postwar period after materials and manpower become available in quantities sufficient to permit general resumption of primary line construction.*
4. *Based on REA pre-war construction costs.*
5. *Assuming that a $2,000 expenditure will involve one man year of direct and indirect labor.*

TABLE 5

ESTIMATE OF RURAL CONSUMER EXPENDITURES FOR WIRING, PLUMBING, AND ELECTRIC FARM[4] AND HOUSEHOLD EQUIPMENT DURING THE IMMEDIATE POSTWAR PERIOD

	BY CONSUMERS CONNECTED PRIOR TO JANUARY 1, 1944[1]	BY CONSUMERS CONNECTED DURING PROPOSED 5-YEAR[2] CONSTRUCTION PROGRAM	COMBINED CONSUMER PURCHASES
EXPENDITURES FOR WIRING			
FARMS	102,280,000	397,445,000	499,725,000
OTHER RURAL DWELLINGS	170,000,000	82,278,000	252,278,000
TOTAL	272,280,000	479,723,000	752,003,000
MAN YEARS OF LABOR[3]	138,140	239,861	376,001
EXPENDITURES FOR PLUMBING			
FARMS	287,662,000	215,854,000	503,516,000
OTHER RURAL DWELLINGS	153,000,000	51,424,000	204,424,000
TOTAL	440,662,000	267,278,000	707,940,000
MAN YEARS OF LABOR[3]	220,330	133,639	353,969
EXPENDITURES FOR ELECTRIC FARM AND HOUSEHOLD EQUIPMENT			
FARMS	767,100,000	1,096,400,000	1,863,500,000
OTHER RURAL DWELLINGS	1,020,000,000	182,840,000	1,202,840,000
TOTAL	1,787,100,000	1,279,240,000	3,066,340,000
MAN YEARS OF LABOR[3]	893,550	639,620	1,533,170
TOTAL OF WIRING, PLUMBING AND ELECTRIC FARM AND HOUSEHOLD EQUIPMENT			
TOTAL EXPENDITURES	2,500,042,000	2,026,251,000	4,526,293,000
TOTAL MAN YEARS OF LABOR	1,250,020	1,013,120	2,263,140

1. Purchases during the five-year period after materials and manpower have become generally available.
2. Purchases during the five-year period following initial connection under the construction program.
3. Under the assumption that each $2,000 of expenditure involves one man year of direct and indirect labor.
4. Refer to text for basis of expenditure estimates.

As shown in Table 5, it is estimated that these old and new rural consumers offer an almost immediate market for wiring jobs totalling about $752,000,000, for plumbing installations totalling about $708,000,000, and for farm and household appliances totalling about $3,066,000,000, or a grand total of $4,526,000,000, involving about 2,263,000 man-years of direct and indirect labor.

These figures leave out of consideration the demand for wiring and electrical equipment in connection with the electrification of schools, churches, and other community buildings, the establishments of new and the electrification of existing rural service and processing industries and other commercial enterprises. But even with that omission the rural electrification program, if vigorously carried out, can account for five and a half billion dollars of national industrial production, and can result in two and three-quarter million man-years of private employment, largely within a period of five years.

Basis of Calculation of Consumer Expenditures

A number of tangible and intangible factors entered into the estimates of consumer expenditures shown in Table 5. The basis of calculation finally used is outlined below. All costs are based on prewar prices and wages.

Expenditures During the Five-Year Period By Consumers Connected Before 1944

For additional wiring, the 2,557,000 farm consumers will spend an average of $40 each, the 6,800,000 other rural consumers an average of $25 each. For plumbing, about 50 percent of the 2,557,000 farm consumers will spend an average of $225 each, and of the 6,800,000 other rural consumers about 10 percent will spend an average of $225 each. For electric equipment the 2,557,000 farm consumers will spend an average of $300 each, and the 6,800,000 other consumers an average of $150 each.

Expenditures By Rural Consumers Connected Under the Five-Year Program

Since it cannot now be determined how many consumers will be connected during each of the five years, this consumer expenditure estimate is based on what purchases each consumer can be expected to make within five years after receiving service. As in the previous calculations, differentiation is also made between farm and other rural consumers. It is estimated that of the total of 3,655,000 consumers to be served under the five-year program, about 2,741,000 will be farm consumers and 914,000 will be other rural consumers.

For wiring, the 2,741,000 farm consumers will spend an average of $145 each, and the 914,000 other rural consumers an average of $90 each. For plumbing, 35 percent of the farm consumers and 25 percent of the others will spend an average of $225 each. For electrical equipment, the farm consumers will spend an average of $400 each, and the others an average of $200 each.

All of these estimates are, of course, based on the assumption of a continued high agricultural income during this period. Programs like the one here outlined are among the best means of keeping up national employment and purchasing power.

Proposal for a Three-Year REA Program

The Department of Agriculture has proposed that the Rural Electrification Administration complete necessary plans for a 3-year program of rural electrification through REA-financed rural power systems. Preliminary steps have already been taken in the planning of such a 3-year program.

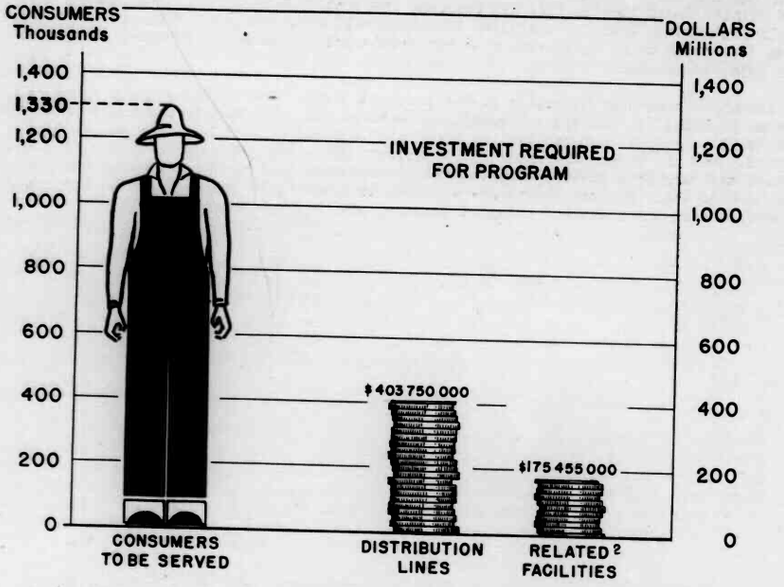
This proposal contemplates that central station service be made available, under the provisions of the Rural Electrification Act, to slightly more than 1 1-4 million farms and rural homes of America. This program would require, as shown in Table 6, total loans of about 579 million dollars for the construction of distribution lines and installation of electric facilities. It would require nearly 300,000 man-years of direct and indirect labor. Estimated expenditures for wiring, plumbing, farm and household equipment, would run to an additional 700 million dollars.

For the purpose of financing the construction of necessary lines and installations of related facilities in this REA program, the established REA policy of making only self-liquidating loans to qualified borrowers will be continued. These interest-bearing loans will be in accordance with the provisions of the Rural Electrification Act of 1936, as amended.

A tentative breakdown by states of the proposed 3-year line construction program is shown in Table 7. The state figures are based on unelectrified farm surveys conducted by REA-financed cooperatives, on applications received by REA or now being prepared, and on other available information. While the actual program in any one state may vary from these estimates, REA is confident that the program as a whole can be carried out, provided that costs will not be much higher than before the war, and provided that the necessary detailed planning can be done in advance.

TABLE 6

3-YEAR REA POSTWAR PROGRAM FOR RURAL ELECTRIFICATION[1]



1. The three-year period after materials and manpower become available in quantities sufficient to permit general resumption of primary line construction. Construction costs are based on REA pre-war experience.

2. Loan funds to finance the improvement of existing electric systems, the construction of generation and transmission facilities, and the purchase by rural consumers of farm and home electric installations.

TABLE 7

3-YEAR REA PROGRAM FOR POSTWAR RURAL ELECTRIFICATION - BY STATES[1]
(TENTATIVE)

AREA	RURAL CONSUMERS TO RECEIVE SERVICE	TOTAL MAN-YEARS OF LABOR INVOLVED	INVESTMENT REQUIRED FOR PROGRAM	
			DISTRIBUTION LINES	RELATED FACILITIES[2]
ALABAMA	42,700	5,000	10,000,000	2,000,000
ARIZONA	5,200	1,000	2,000,000	100,000
ARKANSAS	47,400	7,500	15,000,000	5,100,000
CALIFORNIA	3,700	800	1,500,000	750,000
COLORADO	15,900	3,000	6,000,000	3,400,000
CONNECTICUT	--	--	--	--
DELAWARE	3,000	500	1,000,000	250,000
FLORIDA	10,100	1,500	3,000,000	1,750,000
GEORGIA	89,500	10,000	20,000,000	5,600,000
IDAHO	5,100	1,000	2,000,000	1,950,000
ILLINOIS	42,700	7,500	15,000,000	4,500,000
INDIANA	34,900	5,000	10,000,000	4,525,000
IOWA	51,600	10,000	20,000,000	7,000,000
KANSAS	23,300	4,500	9,000,000	3,600,000
KENTUCKY	46,600	6,000	12,000,000	3,500,000
LOUISIANA	37,500	5,000	10,000,000	6,100,000
MAINE	1,300	200	400,000	125,000
MARYLAND	6,900	1,200	2,500,000	800,000
MASSACHUSETTS	--	--	--	--
MICHIGAN	12,300	2,000	4,000,000	3,600,000
MINNESOTA	57,700	11,000	22,000,000	9,500,000
MISSISSIPPI	53,300	6,000	12,000,000	3,500,000
MISSOURI	114,600	15,000	30,000,000	16,500,000
MONTANA	10,300	2,000	4,000,000	1,100,000
NEBRASKA	24,700	5,500	11,000,000	2,300,000
NEVADA	500	100	200,000	55,000
NEW HAMPSHIRE	2,800	500	1,000,000	950,000
NEW JERSEY	800	200	300,000	150,000
NEW MEXICO	8,200	1,500	3,000,000	1,150,000
NEW YORK	6,600	1,000	2,000,000	830,000
NORTH CAROLINA	71,200	9,000	18,000,000	10,000,000
NORTH DAKOTA	15,600	3,000	6,000,000	3,000,000
OHIO	16,500	2,500	5,000,000	2,750,000
OKLAHOMA	77,700	12,500	25,000,000	13,800,000
OREGON	13,300	2,500	5,000,000	2,000,000
PENNSYLVANIA	17,200	3,000	6,000,000	5,300,000
RHODE ISLAND	--	--	--	--
SOUTH CAROLINA	34,000	3,800	7,500,000	3,550,000
SOUTH DAKOTA	14,700	3,000	6,000,000	1,750,000
TENNESSEE	57,900	6,000	12,000,000	4,600,000
TEXAS	157,200	25,000	50,000,000	16,000,000
UTAH	2,500	400	750,000	800,000
VERMONT	4,000	800	1,500,000	1,850,000
VIRGINIA	26,200	4,200	8,500,000	6,700,000
WASHINGTON	12,200	3,000	6,000,000	1,750,000
WEST VIRGINIA	3,200	500	1,000,000	350,000
WISCONSIN	34,400	6,000	12,000,000	8,700,000
WYOMING	9,800	2,000	4,000,000	1,300,000
ALASKA	900	200	400,000	350,000
VIRGIN ISLANDS	1,600	100	200,000	200,000
U. S. & TERRITORIES	1,329,300	202,000	403,750,000	175,455,000

1. The three-year period after materials and manpower become available in quantities sufficient to permit general resumption of primary line construction. Construction costs are based on REA pre-war experience.

2. Loan funds to finance the improvement of existing electric systems, the construction of generation and transmission facilities, and the purchase by rural consumers of farm and home electric installations.

PART VI—HOW THE JOB CAN BE DONE

The national job outlined in this Statement is to see to it that 3,655,000 now unserved rural establishments get electricity in five years after the end of the war in Europe. REA stands ready to do its part. But the job cannot be done unless all agencies and groups concerned in the effort, including above all the rural people themselves, will cooperate to the best of their ability.

Practically all rural power systems, whether private or public, whether profit corporations or non-profit cooperatives, can contribute toward reaching the proposed goal. While it appears likely that the majority of unserved farms can be served most economically through locally owned and controlled REA-financed cooperatives, there are also many areas already opened up by power companies where much remains to be done in order to render low-cost service to all rural people in the area who want it. All rural line construction after the war should be planned in accordance with the principle of area coverage.

How State Utility Commissions Can Help

State Utility Commissions have recognized generally that the REA-financed electric cooperatives, operating on a non-profit basis and for the benefit of the member-consumers, need not be regulated in the public interest. Regulation is intended to protect the buyer from exploitation by a seller with monopoly rights. A cooperative enterprise is self-regulatory because it is owned and operated by the members served. As community enterprises, electric cooperatives have the objective of low-cost area-wide electric service to all potential consumers. This can be accomplished only by prudent management. It is in the interest of the cooperative members as owners and users, and of REA, as chief creditor, to make sure that sound management obtains.

State Utility Commissions are, of course, interested in maximum low-cost rural electrification. They can aid that objective by exercising their regulatory powers to assure adequate low-cost supplies of power to cooperatives, by encouraging liberalization of rural line extension requirements of private power companies and by eliminating rate discriminations and promoting rate reductions for rural power service.

They can also aid the objective of full area coverage by preventing further "cream skimming" by power companies. If a power company is not willing to guarantee the extension of rural electric service on an area-wide basis, the people themselves should be given full opportunity and encouragement to undertake the development of both high and low density territory combined on a non-profit basis. Undoubtedly, more rural people will obtain electric service in that way than if commercial power companies were permitted to disregard the public interest by pre-empting the higher density territory in an area and thereby jeopardizing the feasibility of service to the rest of the area.

How Agricultural Leaders and Educators Can Help

Planning by individual community and state groups is the necessary first step toward formulating a sound plan which will meet both sectional and national needs. Local plans, however, must be integrated into a national plan, based upon the Nation's needs and experience, in order to serve both local and national interests. A frank exchahge of views between local and national groups interested in rural electrification, and joint analysis of problems and proposals, has been not only helpful but necessary to the great progress made in the past. Concerted action on a national scale is essential to continued advancement. Cooperation with other groups such as national and state farm groups and associations of cooperatives having a wholesome and legitimate interest in the rural electrification program also has been helpful in the past and should continue in the future.

In their reports, the state agricultural postwar planning committees have done great service for the farmers of this country by pointing out the need of accelerated efforts for electrifying farms. A number of these reports pointed out that many power companies were not interested in doing an area coverage job. Several emphasized that the only hope of getting electric service to many unserved farms is through REA- financed, farmer-owned cooperatives. These committees can do much through influencing the thinking of groups concerned with other phases of rural community improvements, by calling attention to the contribution rural electrification can make to better housing, better health and sanitation, adequate clinical and hospital facilities, school modernization, and establishment of community services and rural industries.

Educational Assistance by Federal and State Agencies

How to obtain the full benefits of an electrical age and to build an effective electro-agriculture must still be learned by most of the Nation s farm families. Electricity is too new a tool, even for those who have already had it for a few years, for them to have discovered and brought to realization its many possibilities for improving farm management and farm living conditions and rural community life.

Before the war, REA engaged in and encouraged continuous study of the many beneficial uses of farm electricity. The successful techniques worked out and applied to a limited degree in the prewar years, and necessarily curtailed during the war, must be revived and expanded at the earliest possible moment if consumer expenditures are to be made on the basis of knowledge rather than fascination.

Educational services of the Department of Agriculture and other government bodies, through agencies concerned with rural educational programs such as the Extension Service, Agricultural Education Service, State agricultural colleges, can help farm people learn how to use electricity more effectively. Providing farmers with knowledge of how to make greater use of power on the farm offers a challenge to researchers and educational groups alike.

How Farmers Can Help

The most important factor in the nation's future rural electrification program will be planning by local people. Locally-developed plans for rural electrification establish a basis for a national program which directly concerns the Rural Electrification Administration. The Department of Agriculture is in turn considering rural electrification needs and opportunities as an integral and coordinated element in the overall national agricultural postwar plans it is helping farmers to develop.

Farmers can help by taking the initiative. If rural America is to have area-wide electric power made available it must be remembered that the program, to succeed, must be developed as a "grass roots" program.

Any farmer or group of farmers still without electricity should, without delay:

1. See the manager or local representative of the REA-financed cooperative whose lines come nearest to his farm, or

2. If no REA cooperative is established in the area, write for information to the Rural Electrification Administration, U. S. Department of Agriculture, St. Louis 2, Missouri. REA can usually arrange for a field representative to meet with a group or committee to explain the rural electrification program and to give advice on how electric service may best be obtained.

3. Talk to the local County Agent or Home Demonstration Agent who may know of others in the area who would like to join in getting an electrification project developed.

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